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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,145	06/19/2007	Robert F. Richards	67901-61	8926

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EXAMINER	
DUKE, EMMANUEL E	

ART UNIT	PAPER NUMBER
3744	

MAIL DATE	DELIVERY MODE
11/24/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/579,145	RICHARDS ET AL.	
	Examiner	Art Unit	
	EMMANUEL DUKE	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/02/2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-9, *are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al. (**U.S. Patent Application Publication No.: 2002/0043895**), hereinafter referred to as Richards et al. '895, in view of Tobita et al. (**U.S. Patent Application Publication No.: 2003/0096104**), hereinafter referred to as Tobita et al. '104.*

Regarding claim 1, Richards et al. '895 discloses a thermal switch *(66, 68, Fig. 3: [0060])* for controlling the flow of heat between a heat source *(62, Fig. 3: [0060])* and a heat sink *(64, Fig. 3: [0060])*, wherein the thermal switch is configured to alternately form a path of high thermal conductance *(16, 68, 64, Fig. 3: [0060], wherein a periodical thermal coupling of the heat sink 64, switch 68 and a second membrane 16 is a path of high thermal conductance)* between the heat source and the heat sink via the at least one the thermal switch, and a path of low thermal conductance *(18, 66, 62, Fig. 3: [0060], wherein a periodical thermal coupling of the heat sink 62, switch 66 and a second membrane 18 is a path of low thermal conductance)* between the heat source and the heat sink. However, he does not disclose the limitation of the thermal switch comprising at least one nanostructure. Tobita et al. '104 teaches: a plate-like molded body *(5, Fig. 1: [0016], [0035], [0044])* with switch capability *[0044]* comprising at

least one nanostructure *(6, Fig. 1: [0018], wherein a nanotubes is a nanostructure)* with high thermal conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Richards et al. '895 thermal switch to include the use of a molded body comprising at least one nanostructure as taught by Tobita et al. '104 in order to effectively facilitate heat radiation from a connecting surface due to an excellent anisotropic property *(Tobita et al. '104– [0006])*.

Regarding claim 2, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 1, Richards et al. '895 further discloses an actuator *(34, Fig. 1A & 3: [0044], [0062])* configured to alternately move between a first position *(Fig. 2C: [0045], wherein expansion position is a first position)* to form the path of high thermal conductance and a second position *(Fig. 2A: [0045], wherein compression position is a second position)* to form the path of low thermal conductance.

Regarding claim 3, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 2, Richards et al. '895 discloses wherein the actuator is deflectable *([0017], claims 37, 44)* to alternately deflect between the first position in which the actuator contacts the at least one nanostructure *(66, 68)* to form the path of high thermal conductance and the second position in which the actuator is spaced *(as shown in Fig. 3)* from the at least one nanostructure to form the path of low thermal conductance.

Regarding claim 5, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 3, Richards et al. '895 discloses wherein the actuator comprises a piezoelectric transducer *([0044], wherein a piezoelectric unit is a piezoelectric transducer)* that deflects to the first position upon application of a voltage *[0044]* to the transducer.

Regarding claim 6, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 1, Tobita et al. '104 further disclose the limitation of

wherein the at least one nanostructure comprises a bundle of carbon nanotubes *(6, Fig. 1: [0054])* with a very high thermal conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Richards et al. '895 thermal switch to include the use of a bundle of carbon nanostructure as taught by Tobita et al. '104 in order to effectively facilitate heat radiation from a connecting surface *(Tobita et al. '104 – [0060-0061])*.

Regarding claim 7, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 6, Tobita et al. '104 further discloses the limitation of wherein the at least one nanostructure further comprises a matrix material *(6, Fig. 1: [0007], [0033])* between the carbon nanotubes.

Regarding claim 8, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 1, Richards et al. '895 further discloses a fluid-tight cavity *(Fig. 3: [0011], claim 1)* interposed between the heat sink and the heat source, the at least one nanostructure being disposed in the cavity, and the cavity containing an insulating gas *(22, Fig. 3, [0046], wherein compressed vapor is an insulating gas)* to increase the thermal resistance of the switch whenever the switch is activated to establish the path of low thermal conductance.

Regarding claim 9, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 1, Richards et al. '895 further discloses a fluid-tight cavity *(Fig. 3: [0011], claim 1)* interposed between the heat sink and the heat source, the at least one nanostructure being disposed in the cavity, and the cavity being evacuated *([0046], wherein decrease in working fluid is the cavity being evacuating)* to increase the thermal resistance of the switch whenever the switch is activated to establish the path of low thermal conductance.

Claim 4 *is rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al. '895, in view of Tobita et al. '104, further in view of Takeuchi et al.* ***(U.S. Patent No. 5,600,197)****, hereinafter referred to as Takeuchi et al. '197.*

Regarding claim 4, the combination of Richards et al. '895 and Tobita et al. '104 disclose and teach the thermal switch of claim 3, however, they did not explicitly disclose the limitation of wherein the actuator comprises an electrostatic transducer that deflects to the first position upon application of a voltage to the transducer. Takeuchi et al. '197 teaches: an actuator comprises an electrostatic transducer *(Fig. 4(c): Col 5, lines 32-42, wherein electrostrictive film element is an electrostatic transducer)* that deflects to the first position upon application of a voltage *(Col 5, lines 32-35)* to the transducer.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Richards et al. '895 actuator to include the use of an electrostrictive film element as taught by Takeuchi et al. '197 in order to provide a superior actuator with a quick operating response, and provides a relatively larger amount of displacement by application of low voltage *(Takeuchi et al. '197– Col 1, lines59-61).*

Response to Arguments

2. Applicant's arguments with respect to claims 1-9, have been considered but are moot in view of the new ground(s) of rejection as stated above.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- U.S. PG Pub No. 2003/0209802 to Awano.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EMMANUEL DUKE whose telephone number is (571)270-5290. The examiner can normally be reached on Monday - Friday; 8:00am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler or Frantz Jules can be reached on 571-272-4834 or 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EMMANUEL DUKE, Examiner
Art Unit 3744
11/16/2009

/Frantz F. Jules/

Supervisory Patent Examiner, Art Unit 3744